

The “Window Of Opportunity” For Life-Sustaining, Liquid Water On Mars

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Geological evidence for liquid water on Mars from the Mars Opportunity rover can be corroborated by modeling the required physical conditions of the current Martian environment as well as those in the past when conditions were more favorable to this metastable state. Utilizing NASA Ames Mars General Circulation Model to examine the pressure and temperature conditions through axis tilts of 10° to 55° in 5° increments of the planet reveal the probability of liquid water on the surface of Mars at least part of the year in latitudes receiving substantial solar radiance. The total number of Martian sols where meta-stable water can exist was computed by summing the individual times throughout the Martian year. The locations of the high probabilities for liquid water correspond to observed geological features that suggest the historical presence of water. The model also shows the probability for water shifting northward as the planet increases in tilt toward what may be considered an ancient sea floor. The high salinity soils of Mars provide additional data to support the probability of favorable conditions for water to exist, and thus create the observable geological features, at least over a long period of time. However, general simulations of atmospheric conditions, such as crude pressure chambers and wind velocity tests affecting variances in humidity and pressure, suggest water would not remain in a liquid state long enough to produce such geological features without a replenishing supply, possible via sub-surface springs.